S/560/61/000/011/007/012
E027/E635

The results of the ---

unfavourable factors, in comparison with control materials which remained in the laboratory over the same period. In experiments with bacteria 2ml. samples of suspensions of Escherichia coli, Aerobacter aerogenes ,. Staphylococcus aureus and Clostridium butyricum containing 500 million organisms or spores per ml. were sealed in ampoules, and exposed to a space flight of unstated duration; the number of viable individuals after the exposure did not differ significantly from the values for the control samples. A similar experiment was carried out with the T2 phage of E. coli and the 1321 phage of A. aerogenes, which were sent in the second satellite; again, no sigificant reduction in the titre of the phage preparations could be detected after return from space. Similar results were obtained with preparations of phage sent into space in the fourth and fifth satellites. Two bottles and six tubes of HeLa cells, some of which were saturated with oxygen, were exposed to space flight

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S/560/61/000/011/007/012
E027/E635

The results of the . ..

conditions, after it had first been shown that vibration and acceleration did not detach the cells from the glass. The cultures without oxygen appeared normal on return, whereas in those exposed to oxygen most of the cells had degenerated. Subculture showed that 90% of the cells, whether detached from or remaining on the glass, were dead; however, two tubes gave good growth, and the cells which grew up showed no abnormalities of morphology. No antigenic differences could be detected in the cells in anaphylaxis and desensitization experiments in guinea-pigs. In subsequent space flights fibroblast and human amnion cell cultures were studied, with similar results. Pieces of human and rabbit skin were also used. On August 12th 1960 two pieces of skin 2.5 x 3.5 cm. in size and 0.5 mm. thick were taken from a human donor, placed in Hanks solution and sent into space in the second satellite. On recovery they were regrafted on the original site in the donor and became firmly attached after seven days.

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The results of the ---

Similar results were obtained with two other donors. An apparatus was devised for making a subculture in space, in order to study the ability of bacteria to multiply under space conditions. In experiments with Clostridium butylicum no deviations from the controls were observed. The second part of the work was devoted to a study of possible genetic effects brought about by exposure to space conditions, mainly by looking for the production of auxotrophic mutants and lysogeny in bacteria. The former were detected by inoculation on a layer of minimal medium which was then covered with an overlay of the same medium in order to fix the colonies. When the latter had grown up their position was noted and an overlay of complete medium was then put on, and the colonies which then grew up as a result of the diffusion of essentialnutrients were selected as auxotrophic mutants. No such mutants could be found in suspensions of Escherichia coli recovered from the second satellite. The experiments on the induction of lysogenic bacteria were carried out on a strain of E. coli lysogenized by a λ phage which had been exposed to cosmic

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The results of the ---

radiation in the fifth satellite. Free phage particles were removed by adding phage antiserum; after the end of the latent period the action of the antiserum was cut short by diluting 1:100, streptomycin was added to inhibit the host organisms, and the mixture was plated out on the indicator strain in order to count the phage particles produced. The results obtained, considered in comparison with control experiments, provided no evidence of induction by cosmic radiation during a space flight of ninety minutes. No difference was observed in the plaque morphology. No changes could be detected in the chemical and physical properties of calf thymus deoxyribonucleic acid recovered after a space flight. The results as a whole indicate that no damage was suffered by isolated cells during a brief exposure to space conditions. There are 6 figures and 10 tables.

SUBMITTED: May 23, 1961

Card 5/5

21739
S/025/61/000/006/001/007
D244/D305

27.000 4112

AUTHOR: Zhukov-Verezhnikov, N. N., Member

TITLE: The first journey to the stars and problems of space biology

PERIODICAL: Nauka i zhizn', 28, no. 6, 1961, 6-7

TEXT: This article briefly discusses a problem encountered in man's first space flight determining the influence of various cosmic factors on the organisms of the cosmonaut. As a first step, research on the effect of overloading, vibrations, ionizing radiation, etc. was carried out on biological objects with a varying degree of sensitivity which were placed in orbiting sputniks, and it is now possible to classify these items according to the levels of their structural-physiological organization. Experiments with dogs, Layka, Belka, Strelka, Chernushka and Zvezdochka showed that living creatures are able to endure safely all the peripetia of space-travel in a hermetically-sealed capsule. Other aims were also pursued by sending guinea-pigs, white mice

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21739
S/025/61/000/006/001/007
D244/D305

The first journey...

and fruit flies into interplanetary space, the former being employed for studying non-susceptibility to different external influences and the latter for genetic purposes... The second group of biological specimens which included skin fragments were studied on the level of their tissue-organization; live tissue appears to be most susceptible to the effect of various flight factors in cosmic space. Additional objects such as cells were also sent into the cosmos, being nurtured in a culture away from the parent organism, from which they were removed. Cells isolated from a cancerous tumor propagate well under such conditions; they can be cultivated on glass beneath a nutritious medium containing the same organic substances that are supplied to the cells of complete organisms by blood and lymph. Bacteria and microscopic fungi were also utilized in these tests, since, being unicellular, they serve as fine specimens for studying the behavior of cells in space. It was found that bacteria capable of producing bacterio-

Card 2/3

ZHUKOV-VEREZHNIKOV, N.N.; MAYSKIY, I.N.; PEKHOV, A.P.; NEFED'YEVA, N.P.

Space microbiology. Mikrobiologiia 30 no.5:809-817 S-O '61.
(MIRA 14:12)

1. Institut eksperimental'noy biologii AMN, SSSR.
(SPACE MICROBIOLOGY)

ZHUKOV-VEREZHNIKOV, N.N.; PEKHOV, A.P.; BUYKO, Ye.A.

Nature and significance of bacteriophage. Report No.3: Ultra-thin phage sections (methods and preliminary data). Biul. eksp. biol. i med. 52 no.10:78-79 O '61. (MIRA 15:1)

1. Iz otdela immunobiologii (zav. - deystvitel'nyy chlen AMN SSSR N.N.Zhukov-Verezhnikov) Instituta eksperimental'noy biologii (dir. - prof. I.N.Mayskiy) AMN SSSR, Moskva.
(BACTERIOPHAGE)

ABELEV, G.I., kand. med. nauk; BUKRINSKAYA, A.G., kand. med. nauk; GEL'TSER, R.R., prof.; GOLINEVICH, Ye.M., prof.; ZHDANOV, V.M., prof.; ZDRODOVSKIY, P.F., prof.; KALINA, G.P., prof.; LAULEN, D.R., kand. med. nauk; KIKTENKO, V.S., prof.; KRYLOVA, O.P., kand. med. nauk; KUCHERENKO, V.D., kand. med. nauk; LOMAKIN, M.S., kand. med. nauk; MOSING, G.S., doktor med. nauk; PERSHINA, Z.G., kand. sel'khoz. nauk; PEKHOV, A.P., doktor biol. nauk; PESHKOV, M.A., prof.; TIKHONENKO, T.I., kand. med. nauk; TOVARNITSKIY, V.I., prof.; SHEN, R.M., prof.; ETINGOF, R.N., kand. med. nauk; KALININA, G.P., prof., nauchnyy red. toma; ZHUKOV-VEREZHNIKOV, N.N., prof., otv. red.; VYGODCHIKOV, G.V., prof., zamest. otv. red.; TIMAKOV, V.D., prof., zam. otv. red. BAROYAN, O.A., prof., red.; KALINA, G.P., red.; PETROVA, N.K., tekhn. red.

[Multivolume manual on the microbiology, clinic, and epidemiology of infectious diseases]Mnogotomnoe rukovodstvo po mikrobiologii klinike i epidemiologii infektsionnykh boleznei. Moskva, Medgiz, Vol.2. [General microbiology]Obshchaia mikrobiologiia. Red. V.M. Zhdanov. 1962. 535 p. (MIRA 16:1)

(Card 2 next card)

BUGROVA, V.I., kand. med. nauk; VINOGRADOVA, I.N., kand.biol. nauk; D'YAKOV, S.I., kand. med. nauk; ZHDANOV, V.M., prof.; ZHUKOV-VEREZHNIKOV, N.N., prof.; ZEMTSOVA, O.M., kand. med. nauk; IMSHENETSKIY, A.A., prof.; KALINA, G.P., prof.; KAULEN, D.R., kand. med. nauk; KOVALEVA, A.I., doktor med. nauk; KRASIL'NIKOV, N.A., prof.; KUDLAY, D.G., doktor biol. nauk; LEBEDEVA, M.N., prof.; PERETS, L.G., prof. [deceased]; PEKHOV, A.P., doktor biol. nauk; PLANEL'YES, Kh.Kh., prof.; POGLAZOVA, M.N., kand. biol. nauk; PROZOROV, A.A.; SINITSKIY, A.A., prof.; FEDOROV, M.V., prof. [deceased]; SHANINA-VAGINA, V.I., kand.biol. nauk; VYGODCHIKOV, G.V., prof., zamestitel' otv. red.; ADO, A.D., prof., red.; HAROYAN, O.A., prof., red.; BILIBIN, A.F., prof., red.; BOLDYREV, T.Ye., prof., red.; VASHKOV, V.I., doktor med. nauk, red.; VYAZOV, O.Ye., doktor med. nauk, red.; GAUZE, G.F., prof., red.; GOSTEV, V.S., prof., red.; GORIZONTOV, P.D., prof., red.; GRINBAUM, F.T., prof., red. [deceased]; GROMASHEVSKIY, L.V., prof., red.; YELKIN, I.I., prof., red.; ZASUKHIN, L.N., doktor biol. nauk, red.; ZDRODOVSKIY, P.F., prof., red.; KAPICHNIKOV, M.M., kand. med. nauk, red.; KLEMPARSKAYA, N.N., prof., red.; KOSYAKOV, P.N., prof., red.; LOZOVSKAYA, Ye.S., kand. med. nauk, red.; MAYSKIY, I.N., prof., red.; MUROMTSEV, S.N., prof., red. [deceased];

(Continued on next card)

BUGROVA, V.I.---(continued) Card 2.
NIKITIN, M.Ya., red.; NIKOLAYEVA, T.A., red.; PAVLOVSKIY, Ye.N., akademik, red.; PASTUKHOV, A.P., kand. med. nauk, red.; PETRISHCHEVA, P.A., prof., red.; POKROVSKAYA, M.P., prof., red.; POPOV, I.S., kand. med. nauk, red.; ROGOZIN, I.I., prof. red.; RUDNEV, G.P., prof., red.; SERGIYEV, P.G., prof., red.; SKRYABIN, K.I., akad., red.; SOKOLOV, M.I., prof. red.; SOLOV'YEV, V.D., prof., red.; TRIBULEV, G.P., dotsent, red.; CHUMAKOV, M.P., prof., red.; SHATROV, I.I., prof., red.; TIMAKOV, V.D., prof., red.toma; TROITSKIY, V.L., prof., red. toma; PETROVA, N.K., tekhn.red.;

[Multivolume manual on the microbiology, clinical aspects, and epidemiology of infectious diseases] Mnogotomnoe rukovodstvo po mikrobiologii klinike i epidemiologii infektsionnykh boleznei. Otv. red. N.N.Zhukov-Verezhnikov. Moskva, Medgiz. Vol.1. [General microbiology] Obshchaia mikrobiologiia. Otv. red. N.N.Zhukov-Verezhnikov. 1962. 730 p. (MIRA 15:4)

1. Deystvitel'nyy chlen Akademii meditsinskikh nauk SSSR (for Zhdanov, Zhukov-Verezhnikov, Vygodchikov, Bilibin, Vashkov, Gromashevskiy, Zdrodovskiy, Rudnev, Sergiyev, Chumakov, Timakov, Troitskiy).

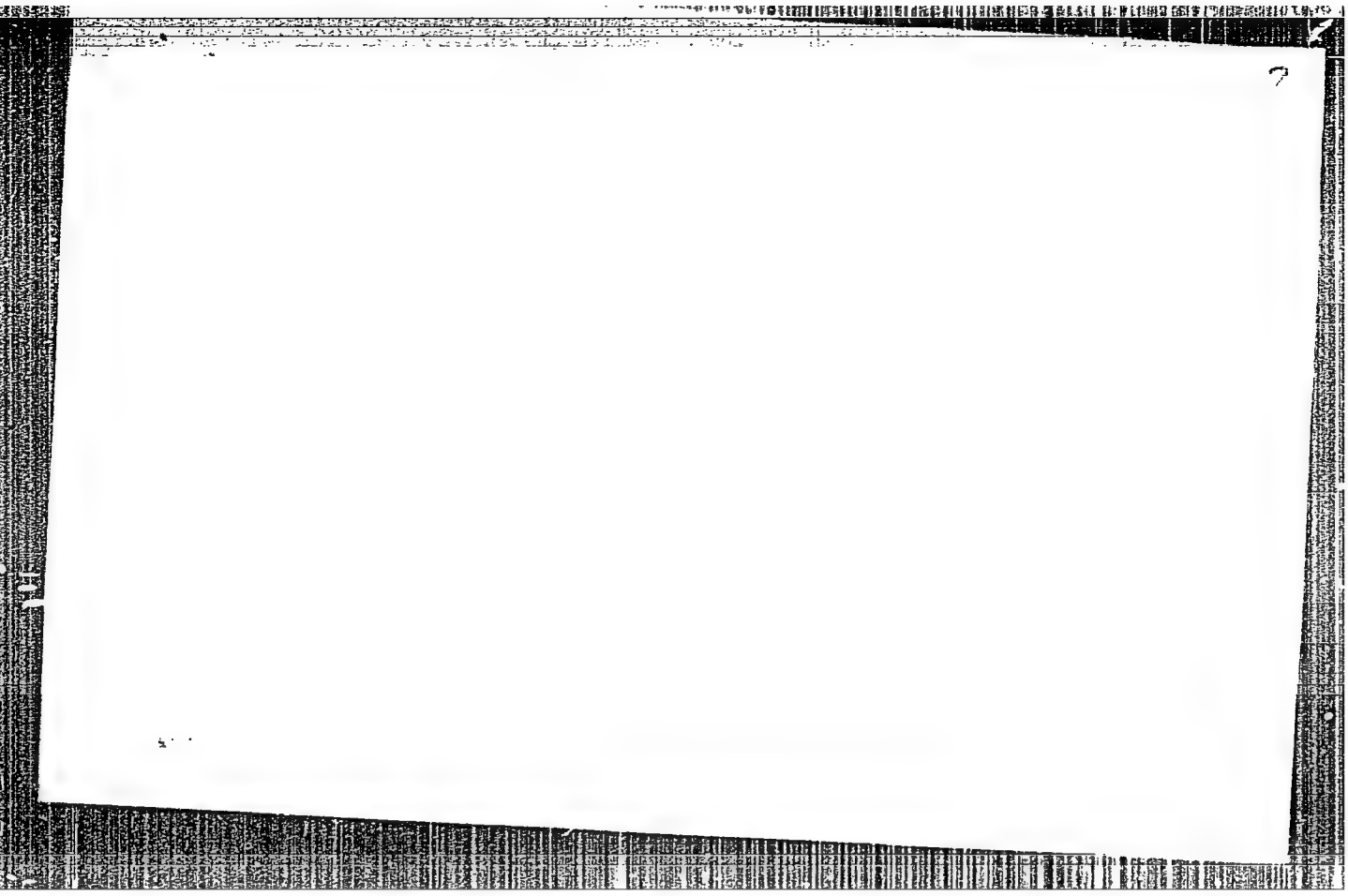
(Continued on next card)

BUGROVA, V.I.---(continued) Card 3.

2. Chlen-korrespondent Akademii nauk SSSR (for Imshenetskiy, Krasil'nikov). 3. Chlen-korrespondent Akademii meditsinskikh nauk SSSR (for Planel'yes, Baroyan, Boldyrev, Gorizontov, Petrishcheva, Rogozin). 4. Deystvitel'nyy chlen Vsesoyuznoy akademii sel'skokhozyaystvennykh nauk im. V.I.Lenina (for Muromtsev).

(MICROBIOLOGY)

SOURCE: Problemy kosmicheskoy biologii, Vol. 1, ed. by N.M.Sisakyan. Moscow, Izd-vo AN SSSR, 1962, 267-284



ZHUKOV-VEREZHNIKOV, N.N.; MAYSKIY, I.N.; YAZDOVSKIY, V.I.; PEKHOV, A.P.; RYBAKOV, N.I.; KLEMPARSKAYA, N.N.; GYURDZHIAN, A.A.; TRIBULEV, G.P.; NEFED'YEVA, N.P.; KAPICHNIKOV, M.M.; PODOPLELOV, I.I.; ANTIPOV, V.V.; NOVIKOVA, I.S.; KOP'YEV, V.Ya.

Problems of space microbiology and cytology. Probl.kosm.biol. 1:118-136 '62. (MIRA 15:12)

(SPACE MICROBIOLOGY) (CYTOLOGY)

ZHUKOV-VEREZHNIKOV, N.N.; MAYSKIY, I.N.; YAZDOVSKIY, V.I.; PEKHOV, A.P.; GYURDZHIAN, A.A.; RYBAKOV, N.I.; ANTIPOV, V.V.

Microbiological and cytological studies in spaceships. Probl. kosm.biol. 2:140-148 '62. (MIRA 16:4)
(SPACE BIOLOGY)

40925

S/025/62/000/009/001/002
D268/D307

27.4000 4312

AUTHORS: Zhukov-Vereshnikov, N. N., Professor, Active Member of the AMN SSSR and Kop'yev, V. Ya., Docent

TITLE: Biology and cosmic flights

PERIODICAL: Nauka i zhizn', no. 9, 1962, 15 - 19

TEXT: Biological conditions of planetary flight are discussed in general terms with special reference to the danger of contamination of the earth by pathogenic micro-organisms introduced by returning ships. As a first step in prevention, study of the surface of the planets by automatic biological probes is advocated. In this context bioelements of the Academy of Medical Sciences capable of automatic recording of the reproduction of micro-organisms and the transmission of appropriate signals to earth were carried by the second Soviet space ship. They consisted of a vessel, usually a metal cylinder, divided into 2 chambers by a glass membrane, one containing spores of butyric fermentation micro-organisms, and the other nutrient

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medium. Spores are sown to the medium when the membrane is broken by earth signal or a programming device on the rocket. Reproduction is accompanied by the formation of gases operating a pressure transmitter through which a signal is sent to earth by radiotelemetric apparatus. These or similar bioelements could be used to determine experimentally whether life is possible under conditions of long-distance flight at velocities approaching that of light with prolonged exposure to acceleration. They might also be used for biological verification of the theory of relativity. There are 6 figures.

JUKOV-VEREJNIKOV, N.N. [Zhukov-Verezhnikov, N.N.]; MAISKI, I.N. [Mayskiy, I.N.]; PEHOV, A.P. [Pekhov, A.P.]; NEFEDIEVA, N.P. [Nefed'yeva, N.P.]

Cosmic microbiology. Analele biol 16 no.3:30-39 My-Je '62.

ZHUKOV-VEREZHNIKOV, N.N.; PEKHOV, A.P.

Anatomy of phages and some problems of genetics. Vest.AMN SSSR 17 no.3: 37-48 '62. (MIRA 15:4)

1. Institut eksperimental'noy biologii AMN SSSR.
(BACTERIOPHAGE) (NUCLEIC ACIDS)

ZHUKOV-VEREZHNIKOV, N.N.; MAYSKIY, I.N.; TRIBULEV, G.P.

Experimental biology and the new concepts of immunogenesis. Vest. AMN SSSR 17 no.4:65-70 '62. (MIRA 15:8)
(IMMUNITY) (BIOLOGY,EXPERIMENTAL)

ZHUKOV-VEREZHNIKOV, N.N.; MAYSKIY, I.N.; PEKHOV, A.P.; TRIBULEV, G.P.; RYBAKOV, I.N.; RYBAKOVA, K.D.

Importance of microbiological objects in the study of pathological changes in genetic coding. Vest.AMN S.S.S.R. 17 no.12:49-59 '62. (MIRA 16:4)

1. Institut eksperimental'noy biologii AMN SSSR.
(MICROORGANISMS) (GENETICS)

ZHUKOV-VEREZHNIKOV, N. N., prof.; KOP'YEV, V. Ya., dotsent

Biology and space flights. Nauka i zhizn' 29 no.9:15-20 S '62.
(MIRA 15:10)

1. Deystvitel'nyy chlen Akademii meditsinskikh nauk SSSR (for Zhukov-Verezhnikov).

(Space biology)

ZHUKOV-VEREZHNIKOV, Nikolay Nikolayevich, prof.; PEKHOV, Aleksandr Petrovich, prof.; SOKOLOV, M.I., red.; MIRONOVA, A.M., tekhn. red.

[Genetics of bacteria] Genetika bakterii. Moskva, Medgiz, 1963. 457 p. (MIRA 16:12)

1. Deystvitel'nyy chlen AMN SSSR (for Zhukov-Verezhnikov).
(GENETICS) (BACTERIA)

ACCESSION NR: AT4042681 S/0000/63/000/000/0185/0188

AUTHOR: Zhukov-Verezhnikov, N. N.; Mayskiy, I. N.; Yazdovskiy, V. I.; Pekhov, A. P.; Ry*bakov, N. I.; Tribulev, G. P.; Saksonov, P. P.; Dobrov, N. N.; Antipov, V. V.; Kozlov, V. A.; Vy*sotskiy, V. G.; Mishenko, B. A, Ry*bakova, D. K.; Parfenov, G. P.; Pantyukhova, V. V.; Yudin, Ye. V.; Aniskin, Ye. D.

TITLE: The evaluation of the biological effectiveness of space-flight factors with the aid of lysogenic bacteria

SOURCE: Konferentsiya po aviatsionnoy i kosmicheskoy meditsine, 1963. Aviatsionnaya i kosmicheskaya meditsina (Aviation and space medicine); materialy* konferentsii. Moscow, 1963, 185-188

TOPIC TAGS: lysogenic bacteria, biological sensor, radiation detector, bacteriophage, phage, vibration, irradiation/Vostok III, Vostok IV

ABSTRACT: Lysogenic bacteria, E. coli K-12 (λ), was carried on spaceships

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ACCESSION NR: AT4042681

Vostok III and Vostok IV as a biological sensor. The advantages of lysogenic bacteria as biological sensors stem not only from their extreme sensitivity to various types of radiation, but also from the fact that induced changes are directly proportional to the dose of irradiation. In addition, E. coli was subjected to the combined effects of radiation and vibration in ground experiments. Vibration was produced by means of a vibrator with frequencies of 35, 70, and 700 cps, an amplitude ranging from 0.4 to 0.005 mm with a load equal to 10 g, for periods of 15, 30, and 60 min. Co^{60} in doses of 100 r at a rate of 21 r per min served as a source of radiation. Lysogenic bacteria carried on spaceships Vostok III and Vostok IV revealed induction of genetic changes produced by space-flight factors which was indicated by a significant increase in the number of phage particles. The induced effect was more pronounced on Vostok III than on Vostok IV. Forty-eight hours after its return to earth, the bacteria carried by Vostok III had produced 4.6 times as many phage particles as controls which had remained on earth. Ground experiments with vibration indicate that the combined vibration and gamma irradiation, followed by a second exposure to vibration, double the biological effectiveness of gamma rays.

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ACCESSION NR: AT4042681

However, when the bacteria is subjected to only a single dose of vibration following irradiation, there is no increase in the number of phage particles as compared to samples which were exposed to irradiation alone. This fact indicates that under space flight conditions vibration sensitizes the lysogenic bacteria to the effect of ionizing radiation. This as yet hypothetical explanation should be substantiated by additional experiments.

ASSOCIATION: none

SUBMITTED: 27Sep63 ENCL: 00 SUB CODE: LS

NO REF SOV: 000 OTHER: 000

Card 3/3

[redacted], N. N.; VOLKOV, M. N.; MAYSKIY, I. N.; TRIBULEV, G. P.; RYBAKOV, N. I.; SAKSONOV, P. P.; ANTIPOV, V. V.; KOZLOV, V. A.; PODOPLELOV, I. I.

"Results of microbiological and cytological investigation on Vostok type space-craft."

paper presented at the 15th Intl Astronautical Cong, Warsaw, 7-12 Sep 64.

ACCESSION NR: AT4037688 S/2865/64/003/000/0184/0192

AUTHOR: Zhukov-Verezhnikov, N. N.; Yazdovskiy, V. I.; Mayskiy, I. N.; Tribulev, G.P.; Pekhov, A.P.; Saksonov, P.P.; Ry*bakov, N. I.; Antipov, V. V.; Artem'yev, N.S.; Kozlov, V. A.; Mishchenko, B. A.; Yudin, Ye. V.; Ry*bakova, K.D.; Aniskin Ye. D.

TITLE: Microbiological and cytological research in the conquest of space

SOURCE: AN SSSR. Otdeleniye biologicheskikh nauk. Problemy* kosmicheskoy biologii, v. 3, 1964, 184-192

TOPIC TAGS: microbiology, cytology, lysogenic bacteria, synchrocyclotron, cyclotron, telemetry, space flight, antiradiation drug, ionizing radiation

ABSTRACT: Microbiological research has concentrated on highly radiosensitive biological objects which register molecular changes in response to irradiation. The specific object selected was lysogenic bacteria, E. coli K-12 (λ), which is very sensitive to ionizing radiation and reacts by producing phage particles. Recent synchrocyclotron experiments have shown that E. coli bacteria react similarly to protons and neutrons and that the phage production is proportional to the irradia-

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ACCESSION NR: AT4037688

tion dose. Other experiments have shown that when subjected to vibration, lysogenic bacteria do not produce phage particles. The value of this lysogenic system stems from the fact that it is highly sensitive to radiation but stable under other stress factors of space flight. In the immediate future it will be necessary to couple this biological radiation sensor with an automatic system which will permit registration and telemetry of information from space to earth. The principles for creating such an automatic telemetry system have already been worked out, and this makes it possible to begin construction of experimental equipment. Apparently, this lysogenic system can also be used for testing the effectiveness of antiradiation drugs. Recent experiments with β-mercaptopropylamine have shown that phage production can be reduced by the use of such drugs. If it turns out that phage production induced by heavy particles can also be reduced by antiradiation drugs, then the lysogenic system could be used for a fast primary selection of new means of chemical protection against radiation.

ASSOCIATION: none

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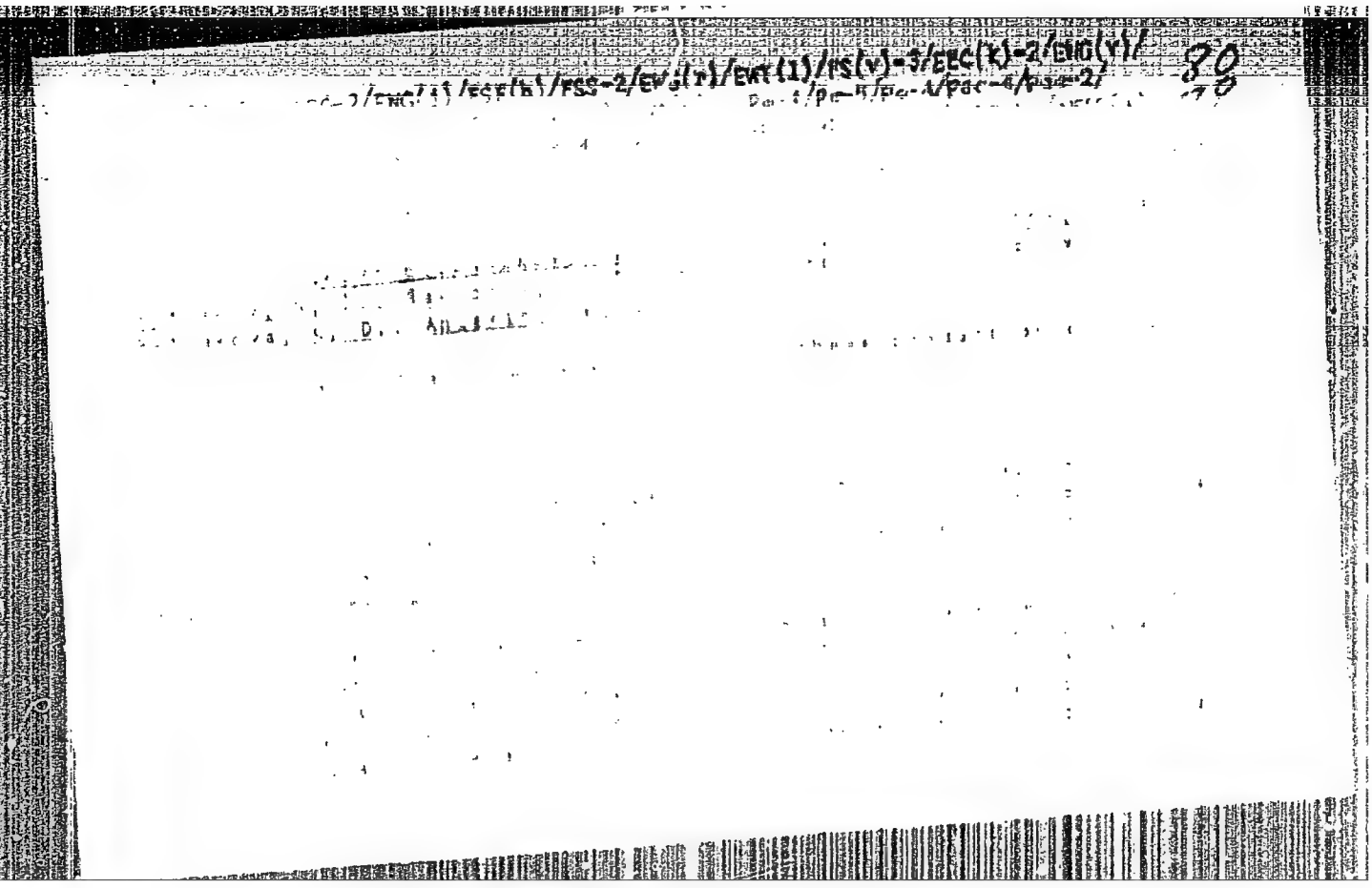

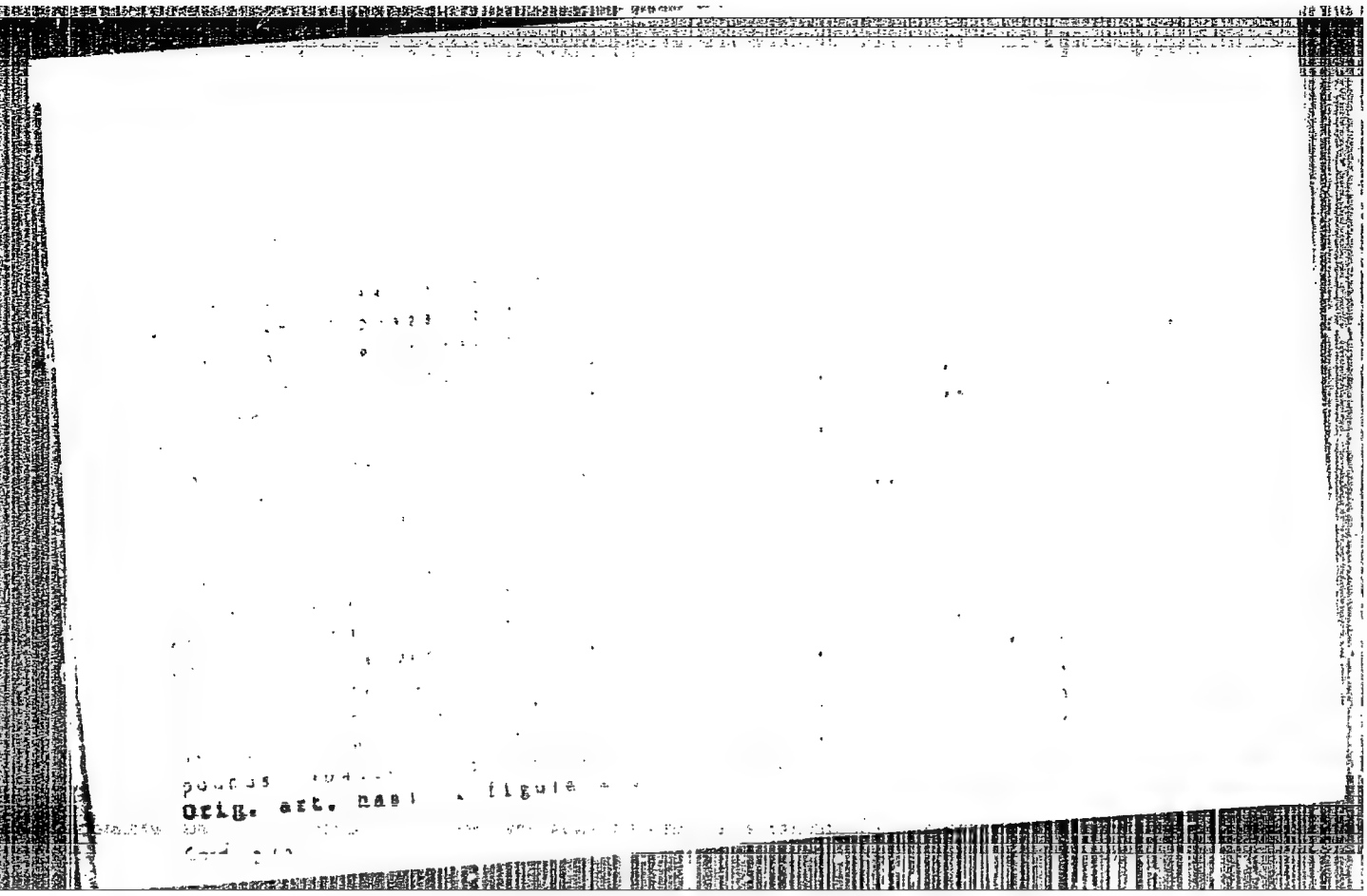

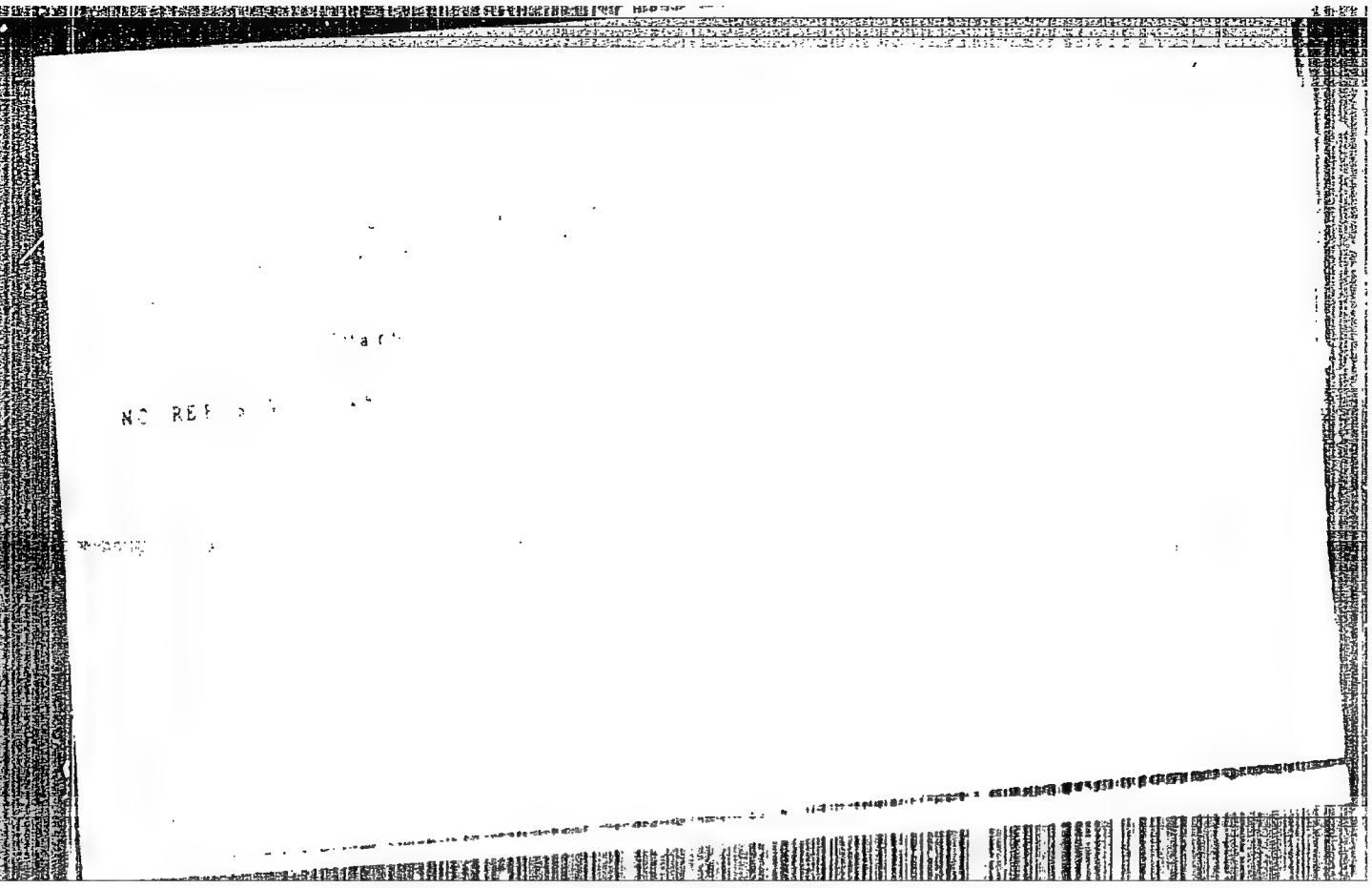

ALEKSANYAN, A.B., prof.; BEZDENEZHNYKH I.S., doktor med. nauk; BELYAKOV, V.D., doktor med. nauk; BESSERTNYY, B.S., dokt. med. nauk; VASHKOV, V.I., prof.; GROMASHEVSKIY, L.V., prof.; YELKIN, I.I., prof.; ZHDANOV, V.M., prof.; ZHMAYEVA, Z.M., kand. biol. nauk; KOVARSKIY, M.S., kand. med. nauk; NABOKOV, V.A., prof.; NOVOGORODSKAYA, E.M., prof.; PAVLOVSKIY, Ye.N., akademik; PETRISHCHEVA, P.A., prof.; PERVOMAYSKIY, G.S., prof.; POGODINA, L.N.; ROGOZIN, I.I., prof.; SUKHOVA, M.N., doktor biol. nauk; CHASOVNIKOV, A.A., kand. med. nauk; SHATROV, I.I., prof.; SHURAMURA, B.L., prof.; YASHKUL', V.K., kand. med. nauk; ZHUKOV-VEREZHNIKOV, N.N., prof., otv. red.; BOLDYREV, T.I., prof., red.; ZASUKHIN, D.N., doktor biol. nauk, red.; KALINA, G.P., red.

[Multivolume manual on the microbiology, clinical aspects and epidemiology of communicable diseases] Mnogotomnoe rukovodstvo po mikrobiologii, klinike i epidemiologii infektsionnykh boleznei. Moskva, Meditsina. Vol.5. 1965. 548 p. (MIRA 18:3)

1. Deystvitel'nyy chlen AMN SSSR (for Aleksanyan, Gromashevskiy, Zhdanov, Zhukov-Verezhnikov). 2. Chlen-korrespondent AMN SSSR (for Rogozin, Boldyrev).

L 14245-66 FSS-2/EWT(1)/EWA(j)/FS(v)-3/EEC(k)-2/EWA(d)/T/EWA(b)-2 SCTB TT/DD/JK/RD
ACC NR: AT6003860 GW SOURCE CODE: UR/2865/65/004/000/0261/0269

AUTHOR: Zhukov-Verezhnikov, N. N.; Rybakov, N. I.; Kozlov, V. A.; Saksonov, P. P.; Dobrov, N. N.; Antipov, V. V.; Podoplelov, I. I.; Parfenov, G. P. 76 71 B41

ORG: none

TITLE: Results of microbiological and cytological investigations conducted during the flights of "Vostok" type vehicles 24155 17

SOURCE: AN SSSR. Otdeleniye biologicheskikh nauk. Problemy kosmicheskoy biologii, v. 4, 1965, 261-269

TOPIC TAGS: bacteria, genetics, bacterial genetics, gamma irradiation, cobalt, radioisotope, microbiology, cytology, space biologic experiment, radiation biologic effect, biologic vibration effect

ABSTRACT: The biological objects used for space research are carefully selected genetic indicators. E. coli K-12 ( ), frequently chosen for these experiments, is a reliable biological dosimeter of the genetic effectiveness of spaceflight factors. When normal and cancerous human cells were exposed in the Vostok series, it was found that these experimental samples did not differ essentially from control samples kept on earth However, some tendency to intensification of phage production was observed in cultures

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of E. coli in this series (an increase by a factor of 1.2 on Vostok-2, 4.6 on Vostok-3, and 1.96 on Vostok-4). Data from repeated exposure of the same biological object indicate accumulation of the spaceflight effect, although the character of this accumulation is not clear. In a comparison of the results of Vostoks 3-6, it was not possible to establish a linear dependence of biological effect on time of exposure in space. However, factors causing a genetic effect (an increase in the phage-producing activity of a lysogenic culture) definitely operated during these flights.

The following derived values of induced phage production were calculated ~3 for Vostoks 3 and 5 (corresponding to the inducing effect of 3.2 rad of gamma-rays), and 1.8 for Vostoks 4 and 6 (corresponding to 0.8 rad of gamma-rays). Since the doses quoted are higher than those encountered in spaceflight, the observed genetic effect must therefore be partially due to other factors (such as weightlessness, acceleration, vibration, etc.).

To study the operation of one of these factors, E. coli K-12 was subjected to vibrations of 18, 35, 75, 100, and 700 cps for 15—30 min. and, in another series of experiments, to vibration in combination with Co^{60}

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L 14245-66
ACC NR: AT6003860

gamma-irradiation (dose, 100 rad; dose power, 21 rad/min). The experimental results show that vibration alone does not induce phage production but does increase the sensitivity of lysogenic bacteria to the subsequent influence of gamma-irradiation. It is suggested that vibration helps sensitize cells of a lysogenic culture to the influence of cosmic radiation, although it is also possible that the cause of genetic changes is weightlessness in combination with radiation. Orig. art. has: 1 figure and 4 tables.
[ATD PRESS: 4091-F]

SUB CODE: 06 / SUBM DATE: none / ORIG REF: 009 / OTH REF: 002

FW
Card 3/3

L 14295-66 EWT(m)/EPF(n)-2 GG/RD

ACC NR: AT6003878 SOURCE CODE: UR/2865/65/004/000/0445/0450

AUTHOR: Zhukov-Verezhnikov, N. N.; Volkov, M. N.; Rybakov, N. I.; Saksonov, P. P.; Kozlov, V. A.; Konstantinov, P. A.; Antipov, V. V.; Dobrov, N. N.; Arlekin, Ye. D.

ORG: none

TITLE: New ways of studying chemical protection against genetic changes

SOURCE: AN SSSR. Otdeleniye biologicheskikh nauk. Problemy kosmicheskoy biologii, v. 4, 1965, 445-450

TOPIC TAGS: bacteria, x ray irradiation, bacterial genetics, chemical agent

ABSTRACT: Aminothiols and some pyrimidine analogs were tested for their ability to block development of infectious phage from prophage after induction of E. coli K-12 (λ) with x-rays. Doses with a previously established non-toxic effect (0.05% concentration) were used. The desired chemical preparation was added to a bacterial culture diluted in a physiological medium. Experimental and control samples were subjected to x-ray irradiation (dose, 15,000 r) and then cultured on agar. The number of induced phage particles in irradiated samples with and without each preparation was then compared. 2-Mercaptopropylamine hydrochloride was

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ACC NR: AT6003878

most effective; cultures treated with it produced 119 times fewer phage particles than control samples. Other good inhibitors of induced phage formation were 2-(gamma-aminopropyl) disulfide dihydrobromide, sodium diethyldithiocarbamate and ammonium dithiocarbamate, which reduced phage production 76.3—70.1 times. Less effective were the salts of β-mercaptoethylamine tested: 2-mercaptoethylamine hydrobromide, 2-mercaptoethylamine disulfide hydrochloride, 2-mercaptoethylamine hydroiodide, and 2-mercaptoethylamine hydrochloride.

The experimental data show the essential connection between the chemical structure of the tested preparations and their ability to block the development of infectious phage. The antigenetic effect of β-mercaptoethylamine preparations is determined by their acid radicals as well as by their base. It may be possible to obtain even more effective preparations of this compound by forming salts with other acids. The failure of 3-β-aminoethylisothiuronium hydrobromide to produce an antigenetic effect is especially interesting because in previous experiments this compound decreased the death rate of animals subjected to a lethal radiation dose by 70-100%. Orig. art. has: 1 table. [ATD PRESS: 4091-F]

SUB CODE: 06 / SUBM DATE: none / ORIG REF: 013 / OTH REF: 003

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L 14294-66

ACC NR: AT6003881

tained in the second generation. However, preparation P-46 completely removed the injurious radiation effect in that generation. Experimental data indicate the possibility of partially or completely removing the depressing effect of β-radiation on plants with the help of physiologically active compounds. Orig. art. has: 4 tables. [ATD PRESS: 4071-F]

SUB CODE: 06 / SUBM DATE: none / ORIG REF: 004 / OTH REF: 005

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L 37643-66 FSS-2/EWT(1)/EEC(k)-2/FCC/T SCTB TT/DD/JK/GW

ACC NR: AP6024650 SOURCE CODE: UR/0216/66/000/004/0592/0593

AUTHOR: Zhukov-Verezhnikov, N. N.; Mayskiy, I. N.; Pekhov, A. P.; Rybakov, N. I.; Dobrov, N. N.; Antipov, V. V.; Kozlov, V. A.; Saksonov, P. P.; Podoplelov, I. I.

ORG: none

TITLE: Results of study of the effect of cosmic radiation and other spaceflight factors on lysogenic bacteria and human cell cultures [Paper presented at the Anniversary Symposium of the Institute of Biophysics of the Czechoslovak Academy of Sciences held in Brno in May 1965]

SOURCE: AN SSSR. Izvestiya. Seriya biologicheskaya, no. 4, 1966, 592-593

TOPIC TAGS: spaceflight effect, radiation effect, Hela cell, lysogenic bacteria / Vostok 4 spacecraft, Vostok 6 spacecraft, Voskhod 1 spacecraft

ABSTRACT: Single-layer cultures of normal human cells (fibroblasts and amniotic cells) and human cancer cells (Hela strain), together with cultures of lysogenic bacteria (E. coli K-12), have been consistently used as radiation indicators on Soviet spacecraft. Results of these experiments have shown that repeated exposure of a culture of Hela cells to spaceflight factors on the Vostok-4 and Vostok-6 flights produced

Card 1/2 UDC: 629.195:577.391

L 37643-66

ACC NR: AP6024650

changes in experimental cells as compared with laboratory controls and with Hela cells exposed on one spaceflight only. A longer latent period of recovery of growth capacity and other characteristics [not named] were noted in twice-flown cultures. In addition, the coefficient of proliferation for Hela cells exposed on both Vostok-4 and Vostok-6 was one-half that for intact controls and for Hela cells exposed to spaceflight only once. These data suggest that spaceflight factors have a cumulative biological effect on human cell cultures. However, a direct dependence of biological effect on length of spaceflight exposure has not been established in experiments with the other radiation indicator, the lysogenic bacteria E. coli K-12 (λ). It is interesting to note that when the same Hela cells used on Vostok-4 and Vostok-6 were also exposed on Voskhod-1, a well-defined drop in the proliferation coefficient was observed in comparison with intact cultures. Experimental colonies were more compact, and there were more dead cells. Other reliable differences [not enumerated] were also found between intact controls and thrice-exposed cultures. However, no reliable differences could be detected between thrice-exposed Hela cells and a control strain used only on Vostok-6. It is suggested that the biological effect of spaceflight may be the result of the combined influence of radiation, vibration, and weightlessness. [JS]

SUB CODE: 06/ SUBM DATE: none/ ATD PRESS: 5146

Card 2/2 vmb